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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/472,018	12/27/1999	YOSHIMASA FUJITA	900-312	8225

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EXAMINER

ROY, SIKHA

ART UNIT	PAPER NUMBER
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2879

DATE MAILED: 01/03/2002

4

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/472,018

Applicant(s)

FUJITA ET AL.

Examiner

Sikha Roy

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 December 1999.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) _____ is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2. 6) ☐ Other:

DETAILED ACTION

Specification

The disclosure is objected to because of the following informality:

Page 21 line 9, "2" should be replaced by --3--.

Appropriate correction is required.

Claim Objections

Claim 10 is objected to because of the following informalities:

The limitations of claim 10 are recited such that the organic electroluminescent elements have all the constitutions from 1 through 5. The recitation should be in alternative form. The examiner respectfully submits that the limitation should read as 'the organic electroluminescent element is selected from at least one of the following constitutions', the word 'and' between (4) and (5) should be replaced by 'or'.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1,4 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent 5,858,562 to Utsugi et al. in view of JP 04297076 to Takashi.

Utsugi et al. disclose (column 4 lines 58-67) an organic thin film electroluminescence device comprising an anode, a hole transporting layer in contact with the anode, an electron injection restraining (a potential barrier) layer in contact with the hole transport layer, a light emission layer in contact with the potential barrier layer and a cathode in contact the light emission layer. The electron injection restraining layer (potential barrier layer) secures a sufficiently high degree of confinement of electrons, in the light emission layer ensuring a high probability of recombination of holes and electrons in the light emission layer (column 3 lines 51-58). Utsugi et al. further disclose (column 8 lines 64-67) an electron injection layer provided between the cathode and the light emission layer.

Claims 1 and 6 differ from Utsugi et al. in that Utsugi et al. do not exemplify on the acceptor in the hole transporting material.

Takashi in analogous art of organic EL element discloses (please see the English abstract) hole transporting layer 3 in contact with the anode doped with acceptor and the electron injecting layer 5 doped with donor. It is to be noted that the acceptor increases the conductivity of the layer and hence increases the efficiency of luminance of the device.

Therefore it would have been obvious to one having ordinary skill in the art at the time of invention to modify the hole transporting layer of the electroluminescent

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element of Utsugi et al. by the hole transporting layer with acceptor as taught by Takashi for increasing the efficiency of luminance of the electroluminescent element.

Referring to claim 2, Utsugi et al. disclose (column 4 lines 60-67) that the potential barrier layer in contact with the hole transport layer have energy band gap higher than the energy band gap of the hole transport layer and the light emission layer in contact with the potential barrier layer has energy band gap smaller than that of barrier layer. Hence hole transporting layer with the electron acceptor and the light emission layer both have intrinsically more electron affinity than that of the electron injection restriction layer in between.

Referring to claim 4, Utsugi et al. disclose (column 77 lines 18,19) the electron injection restraining (potential barrier) layer comprising of N, N'-diphenyl-N, N'-bis-(3-methylphenyl) which constitute hole transporting material.

Referring to claim 6, Utsugi et al. disclose (column 112 lines 5-7) the electron injection restriction (potential barrier) layer has a thickness not more than 10nm.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent 5,858,562 to Utsugi et al. in view of JP 04297076 to Takashi and further in view of U. S. Patent 5,256,945 to Imai et al.

Imai et al. in relevant art of electroluminescence element disclose (abstract) a second hole transporting layer in contact with anode formed of organic compound having cyano group, nitro group. The cyano and nitro group acting as acceptor increases conductivity, thereby decreasing voltage and hence improves the durability of the organic EL element (column 7 lines 50-56).

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to specify the cyano group as the acceptor or doping material for the hole transporting layer of Takashi as suggested by Imai et al. for improving the light emission and durability of the organic EL element.

Claims 3,5,7, 9,10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent 5,858,562 to Utsugi et al. in view of JP 04297076 to Takashi and further in view of U. S. Patent 5,869,199 to Kido.

Referring to claims 3,5,7 and 10, Utsugi et al. and Takashi do not exemplify the hole injection restraining layer on the electron transporting layer and in contact with the light emission layer.

Regarding claim 5 and 10, Kido in relevant art of organic electroluminescent elements disclose (column 3 lines 55-63) electron transporting material with electron transport properties and superior hole-blocking properties. It is noted that this layer with hole injection restraining (hole blocking) layer increases the efficiency of recombination of electrons and holes in the light emission layer because of containment of excitons generated by the combination of electrons and holes, thus contributing a further increase in luminous efficiency, luminance of the luminescent layer and stability accompanied thereby.

Therefore it would have been obvious to one having ordinary skill in the art at the time of invention to modify the electron injection layer of Utsugi et al. and Takashi by adding another hole blocking layer for increasing the luminous efficiency of the organic EL element.

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Referring to claim 3, the ionization potential of the light emission layer and that of the donor are intrinsically less than the ionization potential of the hole blocking layer in between so that the electrons will be transported and combined in the light emission layer.

Referring to claim 7, Kido discloses (column 7 lines 53-60) the thickness of the hole blocking (derivative layer) layer is about 10 –20 nm.

Referring to claim 9, Kido discloses electron transport layer comprising of organic compound 3-(4-biphenyl)-4-phenyl-5-(4-tert-butylphenyl)-1,2,4-triazole which are polycyclic compounds.

Referring to claim 11, Kido discloses different organic layers are formed as films by vapor deposition.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following patents are cited to show the state of the art related to organic electroluminescent devices.

U. S. Patent no. 5,759,444 to Enokida et al.

U. S. Patent No. 6,013,384 to Kido et al.

U. S. Patent No. 6,150,042 to Tamano et al.

U. s. Patent No. 5,989,737 to Xie et al.

JP 410270171 A to Kido et al.

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Contact Information

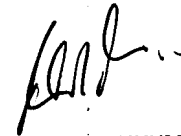
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sikha Roy whose telephone number is (703) 308-2826. The examiner can normally be reached on Monday-Friday 8:00 a.m. – 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar D. Patel can be reached on (703) 305-4794. The fax phone number for the organization is (703) 308-7382.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

S.R.

Sikha Roy
Patent Examiner
Art Unit 2879



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